Effective Waste Management as a Predictor of Competitive Advantage: Mediating Role of Green Purchasing and Logistics

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Abstract--- Nowadays organizations are facing intensive competition regardless of the industry and scale of operations. Globalization has also heightened the competition between the firms. On the other hand the rising global environmental issues have also created a tough environment for organizations as they are already focusing to gain the competitiveness. The study has attempted to study the impact of effective waste management on the competitive advantage. While the study has also considered the green supply chain practices as a potential mediator. The data were collected from the employees working in manufacturing companies in Thailand. The findings revealed a positive association between waste management and competitive advantage. Further findings also revealed that green logistics and purchasing acts as a mediator between relationships of waste management and competitive advantage. The future direction are provided at the end of research paper.

Key Words: *waste management, competitiveness, green, supply chain*

1. Introduction:

Sustainable development has emerged to be significant topic among the domain of academia and industry since 1987. With the industrial revolution the environmental concerns are increasing. Environmental issues such as global warming, raising global temperature and gases emission etc. has gained much more attention which ultimately triggered the need for sustainable development [32]. At this point it is worthy to mention that end user has also become aware of the current situation of the environment and they are more concerned towards it [33]. All the sectors are damaging the environment [1]. In this regard the current study has considered the waste management as a top notch issue spread across the countries around the globe. Recent years have seen greater attention towards the waste management.

Solid waste has become a leading factor for the environmental issues. Especially, it is one of the prevalent issues in developing countries inclusive of Thailand. There is a mushroom growth in the waste generation regardless of any sector and worrying thing is its increase with the time. Still there are some loop wholes in waste management due to several factors such as non-availability of human and financial resources, less productive use of the resources, lack of training and development and lack of awareness regarding the effective waste management system [2].

To manage the waste Thai government has took some serious steps and one of them is that the Thai government has included it in its national agenda. The major focus is on managing the municipal waste in the country. Further it also do covers the industrial, hazardous and infectious waste. The figures of waste in Thailand also pose it as a major issue being faced. As per the statistics the in 2015 industrial waste valued at 37.4 million tons. Out of which 92.5% was nonhazardous whereas the remaining 7.5% was hazardous waste [3]. The study has considered the plastic waste as a potential challenge in Thailand. It is confirmed that Thailand is one of the major plastic manufactures and contributors in Asia. It is also worthy to mention that plastic pellet and resin production capacity was 6.094 million tons. In addition 5.842 and 1.875 million tons were imported

and exported respectively for plastic beads. Surprisingly 2.127 million tons were used in Thailand. 4 million Tons of plastic was used and 2.048 million tons of plastic was used for the packaging. All the presented statistics establish that the waste management particularly the plastic waste management has become a serious issue in Thailand [4]. Figure 1 is showing the details of the waste produced in Thailand.

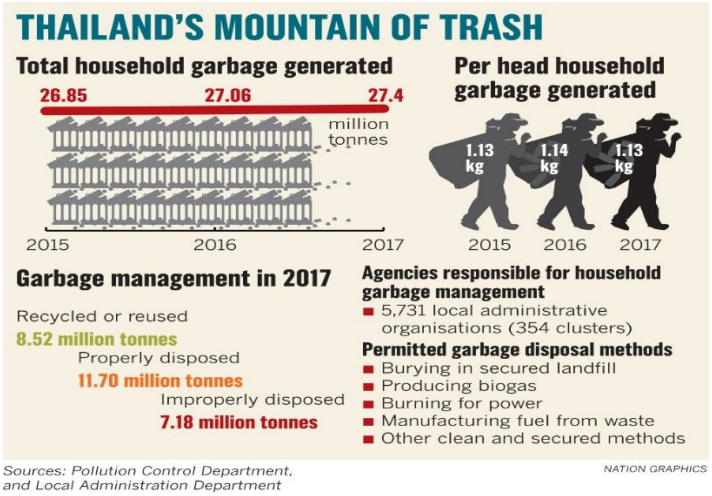

Figure 1:

Source: [5]

Organizational growth does not happen in an isolation. It do carries some threats with it and one of the major threat is the environmental disturbance. Therefore, it has become a greater concern for the industry to balance the growth with the environmental protection [6]. There are steps required to happen the sustainable development. There is need for green initiatives and one of them is the green supply chain management practices [34]. Further it was also argued that businesses and organizations are very much concerned about how to manage the growth, profitability and competitiveness while also considering their impact on environment [35]. Thus, it has triggered the redesigning of business processes and supply chain is been under consideration [7]. Having in mind the importance of the green initiatives, the current study has considered the green purchasing and logistics as a potential outcome of effective waste management.

All the organizations strive hard to be successful and obtain a competitive advantage. So they do follow the philosophy which lead them towards their goal accomplishment. In this regard it was argued that green supply chain management practices is the recently emerged tool to gain superior firm performance. Thus, it is expected that the green purchasing and logistics will play an important role in gaining competitive advantage of firm. Competitive advantage has become the primary concern for the organizations regardless of their industry they are dealing in. So the present study has considered the competitive advantage as a major point of concern from the waste management perspective. The purpose of the present study is to examine the impact of waste management on the competitive advantage. Further green purchasing and logistics have also been considered as a mediator between independent and dependent variables. Therefore, this study will entertain the following research questions:

1. Do the waste management accounts for the competitive advantage of firms?
2. Do the green purchasing accounts for the competitive advantage?
3. Do the green logistics accounts for the competitive advantage?

The study will offer valuable insights for the policy makers and industrialists regarding how to use the green supply chain management practices to gain the competitive advantage. How they can deal with the waste management concerns and turn them into their ultimate strength. The next section of the study will

elaborate the literature review regarding the variable under study.

2. Literature Review

2.1. Competitive Advantage

Competitive advantage has defined in different terms by different researchers over the years. All the definitions carry their own point of concern while defining it. Few of the definitions for the competitive advantage are presented below. Most of the definitions of the competitive advantage focused on different aspects such as profits, efficiency and effectives, market share captured by a firm. Thus it is argued that competitive advantage is actually the firm's ability which distinguishes it from the other firms. Here are the few definitions for the competitive advantage. It is concerned with the improvement of organizational ability to get betterment in production quality, reduction in its cost of production or getting more market share [8]. From another point of view it is the organizational growth which is combined with two things cost reduction or product differentiation or only one of them [9]. Similarly it has also been defined as the extent to which an organization can explore the choices available. From the choices exploitation point of view it was also defined as the degree to which an organization can minimize the threats, costs of production and differentiate itself from others [10]. Competitive advantage can be defined as "something that the firm does better than its competitors that give it an edge in serving customers' needs and/or maintaining mutually satisfying relationships with important stakeholders" [11].

From all above definitions it is obvious that competitive advantage is specifically related to the organizational ability enhancement. Organizations' strive hard to gain the competitive advantage. It is basically related the resource usage for the better performance. Every organization has its own competitive advantage relying on different resources and point of differentiation. In addition, competitive advantage contains the three aspects namely; long term firm survival, it is difficult to reproduce, and it is difficult to identify. There is no unified definition for competitive advantage which creates ambiguity. However, all the definitions are based on the central point of view which is firm performance [36-37].

There are number of factors which result in the competitive advantage such as; production cost and efficiency, profitability, net revenues and firm growth. Alike its definition there is no certain parameter to evaluate it. It may be due to the rational that each organization has different competitive advantage depending upon its industry and its scale of operations. Regarding the competitive advantage it is also stated the most common determinants of competitive advantage are profits, costs, productivity and end-user market share. Competitive advantage is enabler of firms' superior income due to which they enable to earn high profits as compared to competitors. At this point it is necessary to differentiate between performance and competitive advantage. First one is the economic value created by an organization because of its commercialization whereas the competitive advantage also denotes to the economic value but it is generated because of an organization's capability to exploit available resources. It serves as a tool to gain the better performance regardless of the sector in which firm is operating [12].

2.2. Waste Management

Increasing environmental concerns have triggered the awareness to manage the waste among the public and organizations as well. It is now recognized that firms and other sectors of the society cannot persistently generate the waste at the pace as they were before. This has changed the concerns towards the environment sustainability. Nowadays, organizations and society are more proactively concentrating on the environmental issues and trying figure out the way to enhance the ways to manage waste and improve their productivity. Several issues have emerged due to increasing population and one of them is the waste management. The resource sustainability has become a hot topic and triggered the need to manage the waste. Further it has also been stated that the organizational processes can do minimize the costs associated with the environmental issues and enhance the organizational values. The one way to do is the effective supply chain management by redesigning the processes. Therefore, it is argued that when the organizations are effectively managing their wastes and redesigning their production processes they will tend to be more competitive [13].

Waste management falls under the broad term environmental management and it has gained much more importance in the recent times due to increasing environmental concerns globally. All the stake holders are now concerned and keenly interested in environmental management especially in the developed economies [14]. There is small number of research which addresses the outcomes of waste management. Competitive advantage is the direct outcome of the environmental management [15]. In this regard it was argued that nowadays organizations are motivated to alter their business processes. These practices also offers firms with the advantage of product differentiation [16]. Particularly, environmental policies and standards motivate product innovation which in turn lead towards the competitive advantage . Therefore, it is argued that when the organizations are focusing on their policies to manage the wastes they tend to be more environment oriented which in turn lead them towards the competitive advantage. Organizations which are implementing the environmental policies will tend to change their business processes. Thus, it is stated that the organizations with waste management system will tend to be greener purchasing and logistics oriented. More recently a study was conducted in hoteling industry in Spain. The results of the study revealed that the environmental management significantly and positively influences the competitive advantage [17]. Further, the study also concluded that the CA is influence both from the cost and differentiation perspective. Therefore, it is argued that:

H1: Waste management significantly influence the green purchasing of a firm.

H2: Waste management significantly influence the green logistics of a firm.

2.3. Green Purchasing

Generally speaking purchasing refers to the acquisition of good and services which are to be used to accomplish any specific goals. Regarding this it is stated that purchasing is an organizational function which deals with the acquiring the goods and services for organizational usage [18]. In this regard purchasing has been defined as "The management of the company's external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities is secured under the most favorable conditions". It is one of the important function of an organization which can potentially influence the organizational functioning and can affect the financial and environmental performance of an organization [19]. Its importance can be judged from this point that it is now considered as a major factor for the supply chain management and organizations do have a designated department for it as well. Previously it has been argued that role of purchasing in organizational functioning has been ignored by the researchers in academic domain. Even though its role was also not clear in the organizations for years [18].

Sustainability has become a hot topic in the academic and industrial domains which has triggered the need to redesign the businesses to be more sustainable as compared to past. It has also gained significant importance from the society as well and changed the recent development and aligned them with the environment. Therefore, looking at the green or sustainable aspect related to the environment a new term has been introduced which is known as green purchasing. It is directly linked with the sustainability. According to [20], green purchasing is inclusive of procurement of products and services via various SCM activities such as life cycle analysis etc. Green purchasing is beneficial for organizations. This argument has been supported by previous study according to which green purchasing offers benefits to the organizations such that it do influence their pollution and impact on the environment. Finally it can also help the firms to successfully implement the quality and environment related standards [21]. Further, it was also argued that green purchasing reduce the cost of organization related to the environment. It is always considered as one of the major aspect of the organizational costs for the organization on the environment. Thus it cannot be ignored in any way [22].

Green purchasing offers an organization with competitive advantage as it do buy from the suppliers who are also conforming to the environmental policies which makes them more reliable to accomplish the organizational vision to obtain the sustainability. If an organization buys from supplier who is also following the environmental policies tend to have better public image as compared to other

organizations in same industry. In this regard, [6] conducted a study by collecting data from 144 manufacturing Malaysia firms and reported that green purchasing of an organization directly influence its competitiveness. Thus, it is argued that:

H3: Green purchasing significantly influence the competitive advantage of a firm.

2.4. Green Logistics

Logistics is one of the component of supply chain management. As the green concept is integrated in the supply chain thus it also becomes the green logistics. Which is generally focused to align the logistics with the environmental policy of an organization. In this regard it was argued that green logistics has emerged to be significant point of concern in recent years and have gained greater attention because of rising greenhouse gases due to the transportation. It is optimistic approach of supply chain management which plays a decisive role in order to lessen the environmental impact of organizations [23]. Furthermore, it was argued that the green logistics assists to improve an organization's performance both in terms of finance and environmental impact and also provide it with for productive utilization of the resources. While it also do assure the recycling and improved market share of firms [24].

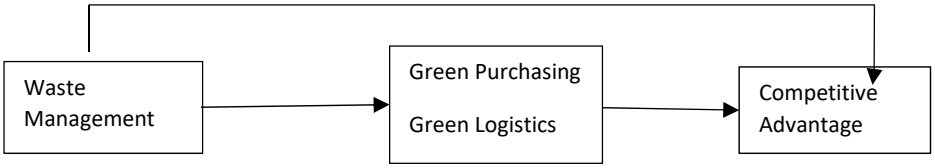

Figure 2:

Green logistics provide an organization with a competitive advantage. Public is more concerned about the companies regarding their environmental impact. When the organizations use the sustainable methods in their products and services delivery they tend to be more environmentally responsible which give them an edge on others. When organizations manage their wastes effectively they also tend to produce less waste and reduce the impact of logistics on environment from production to the delivery of the products and services. It was argued that organizations which x do follow the green logistics tend to produce goods with less energy usage which makes them reusable, durable and easily recyclable. They also tend to use less amount of energy in duration of their transportation which also reduce its environmental impact. Organizations collaborate with others which create a competitive advantage for the firms [25]. Thus it is concluded that organizations having green logistics will tend to be more successful in their operations while having a good public image about them. It is hypothesized that:

H4: Green logistics significantly influence the competitive advantage of a firm.

H5: Green purchasing significantly intervenes the association between waste management and competitive advantage of a firm.

H6: Green logistics significantly intervenes the association between waste management and competitive advantage of a firm.

Following figure 2 is showing the research framework for the study:

3. Methodology

Thailand is progressing at fast pace but while doing this it has harmed its environment. Thailand has been called as 'garbage bin of word'. In Thailand the per head garbage generation is 1.13KG [5]. Having in mind the present study attempted to examine the impact of waste management system on competitive advantage. The study also explored that how the green supply chain practices can intervene the relationship between the variables.

The study is quantitative and descriptive in nature. Time horizon for the study as the data were collected at one point of time. The population of the study was the manufacturing firms in Thailand regardless of their industry. Just the overall manufacturing firms were selected as a potential population for the study. It is not possible to cover the whole population so the representative of the population is selected having same characteristics. The sample size can be determined by using different proposed techniques. In this regard Oke, et al. [26], argued that the sample

size of study for the construction sector should be from 200 to 400 respondents. Whereas the sample size according to the Krejcie and Morgan [27] table is 384 respondents. On the other hand Barlett, et al. [28], argued that sample size should represent at least 20% of the population. However the mentioned techniques are more suitable for the finite number of population and where the population is known. In present study scenario the population was unknown; therefore thumb rule (Hair et al., 2010) has been adopted to select sample size. There were 31 items in the questionnaire which were then multiplied by 10 to obtain the sample size which is 310 respondents.

Data were collected by using self-administered questionnaires. They were distributed among the employees of manufacturing firms who are involved in supply chain and waste management departments. Questionnaire entertained two different nature of questions. One portion entertained the demographic questions whereas the other section addressed the questions related to the variables under study. All the scales were adapted from the previous studies the details of which are as follows: competitive advantage was measured by adapting 13 items scale [29], green purchasing and green logistics were measured by 5 items each [30] and finally the waste management has been measured by adapting 8 items [31].

4. Findings

4.1. Confirmatory Factor Analysis

Table 1.

Constructs	Items	Loadings	Alpha	CR	AVE
Competitive Advantage	CA1	0.729	0.891	0.911	0.509
	CA10	0.753			
	CA2	0.776			
	CA3	0.726			
	CA4	0.718			
	CA5	0.678			
	CA6	0.537			
	CA7	0.699			
	CA8	0.736			
	CA9	0.751			
Green Logistics	GL1	0.892	0.767	0.85	0.594
	GL2	0.764			
	GL3	0.835			
	GL5	0.547			
Green Purchasing	GP1	0.879	0.887	0.917	0.691
	GP2	0.811			
	GP3	0.887			
	GP4	0.854			
	GP5	0.714			
Waste Management	WM1	0.794	0.845	0.884	0.526
	WM2	0.811			
	WM3	0.719			
	WM4	0.457			
	WM5	0.749			
	WM6	0.786			
	WM7	0.699			

To validate the questionnaire confirmatory factor analysis was performed. As per table 1 the values for the reliability of questionnaire for every single variable are 0.891, 0.767, 0.887 and 0.845 respectively. As per the parameter the scale is said to be reliable when the value of reliability are greater

than 0.7. As per the table all the values for reliability falls under the acceptable range which thus establishes the scale reliability.

Furthermore, table 1 is also presenting the values for CR and AVE which are the tow determinants for the convergent validity. The values of CR and AVE should be greater than 0.8 and 0.5 respectively. As per the table the values of CR for the variables namely; competitive advantage, green logistics, green purchasing, and waste management are 0.911, 0.850, 0.917, and 0.884 respectively. Which satisfies the first criterion. Further as per the table 1 the values of AVE for the variables namely; competitive advantage, green logistics, green purchasing, and waste management are 0.509, 0.594, 0.691, and 0.526 respectively. Thus, it also satisfied the second criterion. Therefore, it is argued the convergent validity is established.

4.2. Discriminant Validity

Table 2. Fornell & Larckers Criterion

	CA	GL	GP	WM
CA	0.713			
GL	0.714	0.771		
GP	0.727	0.564	0.831	
WM	0.662	0.6	0.589	0.725

Table two is showing the values for the Fornell & Larckers Criterion which is used as a determinant of the discriminant validity. As per this criterion the value of correlation of a particular variable must be greater than the others in the table. As per the table all the correlational value of a variable is greater than its correlation with others. Thus, discriminant validity is established.

4.3. Cross Loadings

Table 3.

	CA	GL	GP	WM
CA1	**0.729**	0.567	0.504	0.478
CA2	**0.776**	0.578	0.518	0.451
CA3	**0.726**	0.639	0.45	0.507
CA4	**0.718**	0.613	0.458	0.502
CA5	**0.678**	0.419	0.455	0.49
CA6	**0.537**	0.385	0.377	0.34
CA7	**0.699**	0.471	0.569	0.482
CA8	**0.736**	0.509	0.585	0.46
CA9	**0.751**	0.43	0.64	0.504
CA10	**0.753**	0.45	0.599	0.494
GL1	0.646	**0.892**	0.483	0.586
GL2	0.659	**0.764**	0.587	0.437
GL3	0.529	**0.835**	0.417	0.478
GL5	0.272	**0.547**	0.146	0.301
GP1	0.581	0.382	**0.879**	0.54
GP2	0.625	0.548	**0.811**	0.443
GP3	0.649	0.454	**0.887**	0.532

GP4	0.641	0.423	**0.854**	0.545
GP5	0.515	0.576	**0.714**	0.365
WM1	0.576	0.534	0.541	**0.794**
WM2	0.436	0.404	0.405	**0.811**
WM3	0.474	0.398	0.389	**0.719**
WM4	0.331	0.303	0.245	**0.457**
WM5	0.537	0.499	0.486	**0.749**
WM6	0.4	0.378	0.378	**0.786**
WM7	0.533	0.46	0.457	**0.699**

Table 3 is showing the values for the cross loadings. The value of the loadings for a particular variable must be greater than 0.7 and all other variables vertically. As per the table all the values falls under the range. Thus it also do strengthen the discriminant validity.

4.4. Heterotriat-Monotrait Correlation Ratio

Table 4.

	CA	GL	GP	WM
CA				
GL	0.828			
GP	0.814	0.657		
WM	0.753	0.721	0.66	

The last and latest technique for the discriminant validity was applied which is known as HTMT. As per this technique the values for all correlations must be less than 0.85. According to findings presented in table 4 all the correlational value are less than 0.85 thus the discriminant validity is established. Following figure 3 is showing the output of CFA. It is showing the values of factor loadings for each item of measures used in the study.

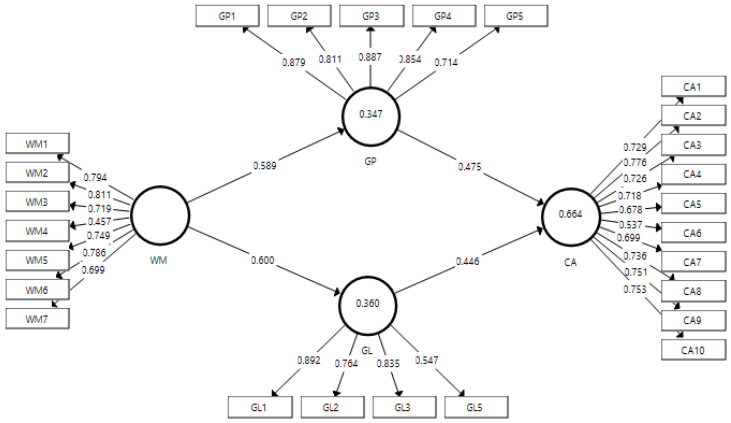

Figure 3:

4.5. Structural Equation Modeling

Table 5.

Relationships	Beta	SD	t value	p value
GL -> CA	0.446	0.026	17.31	p<0.05
GP -> CA	0.475	0.025	18.674	p<0.05
WM -> GL	0.600	0.026	22.936	p<0.05
WM -> GP	0.589	0.026	22.705	p<0.05

Table 5 is showing the results for the direct relationships between the variables. Green logistics found to be significantly associated with competitive advantage. The association is valued at 0.446 which means that organizations collaborating with the partners who are also following the green practices will give them a competitive edge over the companies not considering their environment. In addition similar case is with the green purchasing as well. The association between the green purchasing and competitive advantage is valued at 0.475. The relationship is significant thus the hypothesis are accepted.

In addition the results also showed that waste management and green logistics are significantly associated. The association is valued at 0.600. It is the strongest of all the relationships. It means that 1% change in the waste management will bring about 60% change in green logistics. When organizations are strictly adhering to the waste management policies they tend to go for the green logistics which results in less emissions. Furthermore the results also showed that waste management significantly influence the green purchasing. When the organizations are about to manage their wastes they tend to buy less and only required quantity to reduce the wastes. They tend to effectively manage their raw material purchases in order to cut down the wastes. All the hypothesis are accepted.

4.6. Specific Indirect Effects

Table 6

Relationships	Beta	SD	t value	p value
WM -> GL -> CA	0.268	0.02	13.331	p<0.05
WM -> GP -> CA	0.280	0.021	13.227	p<0.05

Table 6 is showing the results for the mediation relationships between the variables. As per the table green logistics found to be a significant mediator between waste management and competitive advantage. Further the results also signified green purchasing as a mediator between association of waste management and competitive advantage which is valued at 0.280. Green purchasing and logistics both were found to be a significant mediator but the purchasing was the strong as compared to the logistics. The following figure 4 is showing the output of structural equation modeling. It is representing the relational directions and path coefficients of the variables.

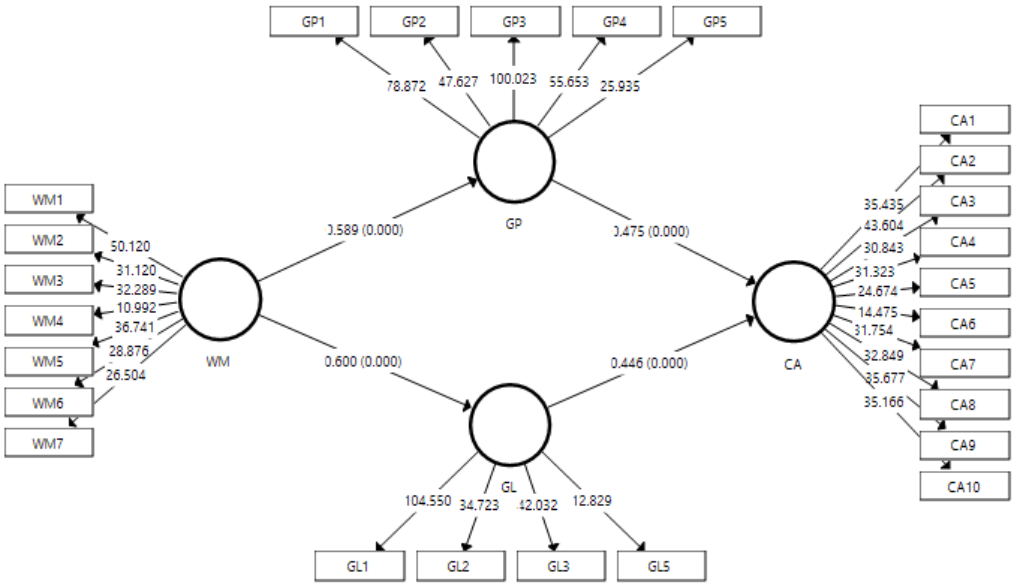

Figure 4:

5. Discussion

The increasing environmental issues have forced the organizations to redesign their business processes and adhere to the environmental policies strictly. Waste has emerged to be a significant concern and potential source for the environmental issues as well. Considering the importance of issue the present study has attempted to explore the impact of effective waste management on the competitive advantage. The aimed to explore that how do the effective waste management can provide organizations with competitive advantage for which they strive hard and invest the resources as well.

Findings of the study revealed that the organizations which are following the environmental policies and adhering to the concern tend to be more competitive as compared to other organizations. The study has valuable insights for the policy makers and top management regarding the policies related to manage the wastes which ultimately lead them towards the competitive advantage.

6. Conclusion and Future Directions

Based on the findings of the study it is concluded that waste management can provide the organizations with the competitive advantage. Organizations which are working on the waste management ultimately successfully embed their positive image in the minds of general public leading towards the high profits etc. On the other hand following the sustainability practices allow an organization to reduce its costs internally and collaboration with partners who are also following the similar philosophy.

All the hypothesis are accepted and objectives are accomplished. However there are some limitations which can serves to be a potential area for future research. The study has not categorized the manufacturing firms regarding their industry. Future studies may compared the industries. The convenience sampling was used which do limit the chance of getting selected for every element. Further studies may use the simple random sampling to avoid the sampling bias of the present study. Furthermore, the role of HR practices in waste management can also be considered as a potential variable to be studied.

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